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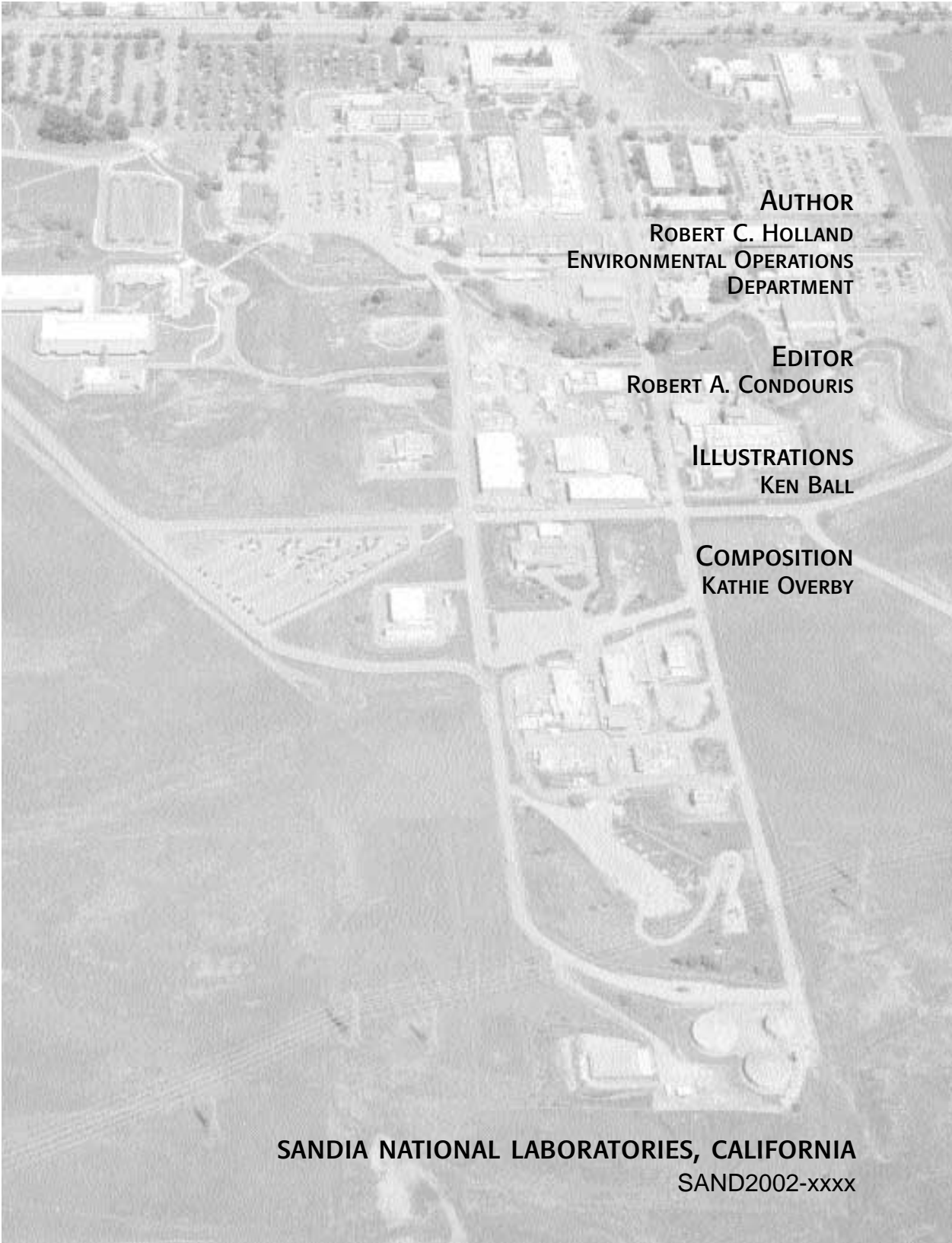
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SITE ENVIRONMENTAL REPORT FOR 2001



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The U.S. Department of Energy (DOE) Order 5400.1, General Environmental Protection Programs, establishes requirements for environmental protection programs at DOE sites, including Sandia National Laboratories (SNL). These programs ensure that DOE operations comply with Federal, State, and local environmental laws and regulations, as well as DOE orders and policies. To comply with DOE Order 5400.1, SNL, California has prepared the Environmental Protection Implementation Plan.¹ This document provides the framework for SNL, California to implement the DOE's environmental protection goals and to comply with environmental regulations.

To verify effective protection of the environment, SNL, California maintains extensive effluent monitoring and environmental surveillance programs. These programs collect the information necessary to assess how effective pollution control measures are and to characterize the site's impact on the environment. The monitoring program routinely measures the levels of pollutants and radioactive material around the Sandia site and surrounding area. The off-site environmental radiation monitoring data in this report were collected by Lawrence Livermore National Laboratory (LLNL), which monitors outlying areas for both facilities. The SNL, California Environmental Monitoring Plan identifies the operations and emissions at the site and describes the effluent monitoring and environmental surveillance programs and activities. These programs and activities are in place to protect the public and the environment. The plan describes exposure pathways (potential routes of human exposure to pollutants), sampling and analysis procedures, radiation dose assessment methods, and quality assurance activities.

The SNL, California Environmental Operations Department is responsible for all-environmental programs and activi-

ties, including reporting requirements. Environmental staff maintain various documents describing specific program areas. These documents are referenced in this report, as appropriate.

The SNL, California Environmental Operations Department prepares the Site Environmental Report annually, as required by the DOE and other regulatory agencies. It describes the results of SNL, California's environmental protection activities during the calendar year. It also summarizes environmental monitoring data and highlights major environmental programs. Overall, it evaluates SNL, California's environmental management performance and documents the site's regulatory compliance status.

Most importantly, the Site Environmental Report serves the needs of the public. It is a key element in our communication with the local community. For this reason, the report contains two summary chapters: Chapter 1, "Executive Summary," and Chapter 3, "Compliance Summary," which highlight and interpret environmental findings and regulatory compliance for the year. These summaries are written for the lay person and use a minimum of technical terminology. We have also included an extensive glossary in the back of the report. It defines acronyms, abbreviations, and technical terms. It also describes radiological nomenclature and conversion information for units used in the report.

The body of the report is a comprehensive description of environmental activities. It provides substantial background information and covers all major environmental programs at SNL, California.

REFERENCES

1. R. C. Holland, Environmental Protection Implementation Plan, SAND2002-8146 (April 2002)

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The National Nuclear Security Administration (NNSA) of the U.S. Department of Energy (DOE) oversees operation of Sandia National Laboratories, California (SNL, California) through the Office of Kirtland Site Operations (OKSO), which reports to the Albuquerque Operations Office. This report was prepared in accordance with DOE Order 5400.1, "General Environmental Protection Program." The report summarizes data from the environmental protection and monitoring program at SNL, California through December 31, 2001. It also discusses SNL, California compliance with environmental statutes, regulations, and permit provisions and highlights other significant environmental programs and efforts at SNL, California. This report is a key component of the DOE's effort to keep the public informed about environmental conditions throughout the DOE complex.

The DOE/OKSO and Sandia Corporation are committed to conducting its operations in an environmentally safe and sound manner. It is mandatory that activities at SNL, California comply with all applicable environmental statutes, regulations, and standards. Moreover, SNL, California continuously strives to reduce risks to employees, the public, and the environment to the lowest levels reasonably possible.

To help verify effective protection of public safety and preservation of the environment, SNL, California maintains an extensive, ongoing environmental protection program. This program monitors all significant effluents from the SNL, California site. Lawrence Livermore National Laboratory (LLNL) performs off-site external radiation monitoring for both sites. These efforts ensure that emission controls are effective in preventing contamination of the environment.

As part of SNL, California's Environmental Protection Program, an environmental surveillance system measures the possible presence of hazardous materials in groundwater, storm water, and wastewater. The program also includes an extensive environmental dosimetry program, which measures external radiation levels around the Livermore site and nearby vicinity.

Each year, the results of the Environmental Protection Program are published in this report, the Annual Site Environmental Report. This executive summary focuses on impacts to the environment. Chapter 3, "Compliance Summary," reviews the site's various environmental protection activities and compliance status with applicable environmental regulations.

The effluent monitoring and environmental surveillance results for 2001 show that SNL, California operations had no harmful effects on the environment or the public. A summary of the monitoring findings is provided below.

AIR MONITORING

SNL, California has no routine emissions of radioactive materials to the air, and therefore does not perform ambient air monitoring. Air monitoring data for radionuclides performed by LLNL in the vicinity of the site can be obtained in the LLNL Environmental Report 2001. Sandia National Laboratories does monitor the usage of various chemicals and fuels as required by its operating permit issued by the Bay Area Air Quality Management District. During 2001, SNL, California did not exceed any of the provisions of its operating permit.

SEWER MONITORING

The sanitary sewer effluent from the SNL, California site is monitored continuously and analyzed weekly to ensure compliance with Federal, State, and local waste-

EXECUTIVE SUMMARY

water discharge limits. Moreover, SNL, California strives to minimize pollutants in liquid effluents to the lowest levels possible.

In 2001, all liquid effluent from the Sandia sanitary sewer outfall complied with the site outfall discharge limits for regulated physical parameters, radionuclides, and Environmental Protection Agency (EPA) priority organic pollutants. On two occasions, the sanitary sewer effluent slightly exceeded the site's discharge limits for the metal copper. Details of all the wastewater monitoring and a summary of the sampling results are provided in the Sewer Outfall Monitoring section of Chapter 4, "Environmental Monitoring Program."

SNL, California also has a special monitoring program for "categorical processes" subject to EPA wastewater pretreatment standards [Title 40 Code of Federal Regulations (CFR), Parts 433 and 469].¹ In 2001, all the liquid effluents from these processes complied with pretreatment discharge standards for metals and organic pollutants. Details of the wastewater monitoring and a summary of the sampling results are provided in the Federal Categorical Processes Monitoring section of Chapter 4, "Environmental Monitoring Program."

The DOE and the State of California have established allowable limits for discharging radionuclides into a public sewer system (see Chapter 4).² These limits have been derived to protect the public and the environment. The current discharge permit issued by the City of Livermore requires SNL, California to sample the sewer effluent for tritium only during heavy rainfall events. During 2001, no samples were analyzed for tritium. Details of the Sanitary Sewer Monitoring Program may be found in Chapter 4, "Environmental Monitoring Program."

STORM WATER MONITORING

A State-issued Industrial Storm Water National Pollutant Discharge Elimination

System (NPDES) general permit and Alameda County storm water ordinances require SNL, California to effectively eliminate non-storm water discharges and reduce pollutant discharge in rain to the storm drain system to the maximum extent practicable. To comply with these requirements, SNL, California conducts a variety of sampling and inspection activities throughout the year. Storm water runoff is sampled and visually inspected during the wet months. The entire site is inspected quarterly during dry weather for non-storm water discharges. The site is again inspected annually to evaluate that on-site outdoor activities minimize the amount of pollutants left on the ground, which can enter by storm water runoff into the storm drain system.

In 2001, samples were collected from eight of the 10 sampling locations. There was not enough runoff at two locations to collect samples. Every effort was made to collect samples within the first 30 minutes of a storm, or as soon as possible thereafter.

No regulatory limits have been set for pollutants in storm water runoff. No pollutants were detected at levels that would be a cause for concern during the 2001 sampling. The analyses for the storm water runoff included metals, toxic organics, tritium, and physical parameters. Details of the Storm Water Monitoring Program may be found in Chapter 4, "Environmental Monitoring Program."

EXTERNAL RADIATION MONITORING

SNL, California and LLNL conduct an extensive program to measure external radiation doses at the Livermore site perimeter and throughout the Livermore Valley.

In 2001, the average annual dose, equivalent from external radiation measured at the Livermore site perimeter was 57.8 mrem (0.58 mSv). This level was significantly higher than the background

radiation dose measured off-site: 53.4 mrem (0.53 mSv). Even though the dose was higher at the site perimeter than the valley locations, the doses were lower than those measured in 2000. Therefore, these low levels are not considered to be of concern. Details of the External Radiation Monitoring Program may be found in Chapter 4, "Environmental Monitoring Program". SNL, California and LLNL conduct an extensive program to measure external radiation doses at the Livermore site perimeter and throughout the Livermore Valley.

GROUNDWATER MONITORING

SNL, California conducts groundwater monitoring in areas of known contamination, areas of past contamination (that have been cleaned-up), and areas thought to be able to provide early warning of contamination.

The Maximum Contaminant Levels (MCLs) for carbon tetrachloride was exceeded at the closed Navy Landfill Site; and the MCLs for several metals were exceeded at MW-406. The MCLs are drinking water standards. Since none of the wells at SNL, California, sample aquifers used for drinking water supplies, these exceedances are not considered significant. SNL, California reports all ground water monitoring results to the appropriate state agency. Details of the ground water monitoring program may be found in Chapter 6, "Groundwater."

RADIATION IMPACT TO THE PUBLIC

All use of radionuclides at SNL, California with a potential for release of radioactive materials to the air are evaluated and compared to regulatory limits. If required by regulation, dose assessments are performed. No dose assessments were required during 2001. SNL, California does not perform operations with the potential for release of radioactive material to water.

COMPLIANCE WITH REGULATIONS

SNL, California expends considerable effort to make sure that site operations comply with all applicable Federal, State, and local regulations. The environmental monitoring data demonstrate that all emissions to the environment from SNL, California in 2001 were well within regulatory standards with the exception of the exceedances for metals in the sanitary sewer noted above. For details of SNL, California's compliance record, see Chapter 3. It summarizes SNL, California's compliance with applicable environmental statutes and regulations for 2001 and discusses current issues related to environmental management.

ENVIRONMENTAL MONITORING PLAN

SNL, California prepared the *Environmental Monitoring Plan*³ in accordance with DOE orders 5400.1 and 5400.5. The plan serves as a guidance document for the Environmental Monitoring Program at SNL, California. The Site Environmental Report provides the results of the Environmental Monitoring Program activities for the year.

The *Environmental Monitoring Plan* contains a comprehensive review of environmental monitoring at SNL, California, including administrative structure, pathway analysis, effluent monitoring, sampling of environmental media, laboratory procedures and quality assurance. It details the operations of each of these areas and documents the rationale behind the diverse monitoring methods. In addition to documenting the monitoring system, the plan provides an in-depth review of the adequacy and scientific defensibility of SNL, California's monitoring program.

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REFERENCES

1. U.S. EPA, Title 40 CFR, Parts 433 and 469, Metal Finishing Point Source Category and Electrical and Electronic Components Point Source Category.
2. State of California, California Code of Regulations, Title 22, Sections 64400 et seq., "California Domestic Water Quality and Monitoring" (1995).
3. R. C. Holland, Environmental Monitoring Plan, Sandia National Laboratories/California, SAND93-8011B (February 1997).

Sandia National Laboratories, California (SNL, California) is a government-owned, contractor operated facility. The Department of Energy (DOE) oversees operation of SNL, California through the Office of Kirtland Site Operations (OKSO), which reports to the Albuquerque Operations Office.

LABORATORY SETTING

SNL, California is located next to the City of Livermore (population approximately 79,000), in eastern Alameda County, 65 km (40 miles) east of San Francisco (see Fig. 2-1). The central site area is surrounded on all sides by undeveloped land, which serves as a buffer zone. The site lies at the western base of the Altamont Hills. To the north is Lawrence Livermore National Laboratory (LLNL), and further north is an expanding business park and commercial development. The property to the south and east of the site comprises agricultural and low-density residential areas. Although principally residential, the area to the west encompasses a wide range of uses, which include a business park, grazing lands, vineyards, and other small agricultural and industrial developments.

FACILITY HISTORY AND MISSION

Sandia Corporation, a wholly owned subsidiary of the Lockheed Martin Corporation, has been the operating contractor of Sandia National Laboratories since

1993. As the primary management contractor, Sandia Corporation is responsible for the site's operations; environment, safety, health, and quality assurance; and all of the site's administrative functions.

Sandia National Laboratories consists of facilities in New Mexico, California, Nevada, and Hawaii. As one of the United States' multipurpose national laboratories, Sandia National Laboratories develops solutions to a wide range of issues facing the country. Sandia National Laboratories' mission includes advanced military technology, energy and environmental research, arms control/nonproliferation, and advanced manufacturing technology. In addition, Sandia National Laboratories is actively pursuing the transfer of commercially viable technology to the private sector to strengthen our nation's economic competitiveness in world markets. Operations at Sandia National Labo-

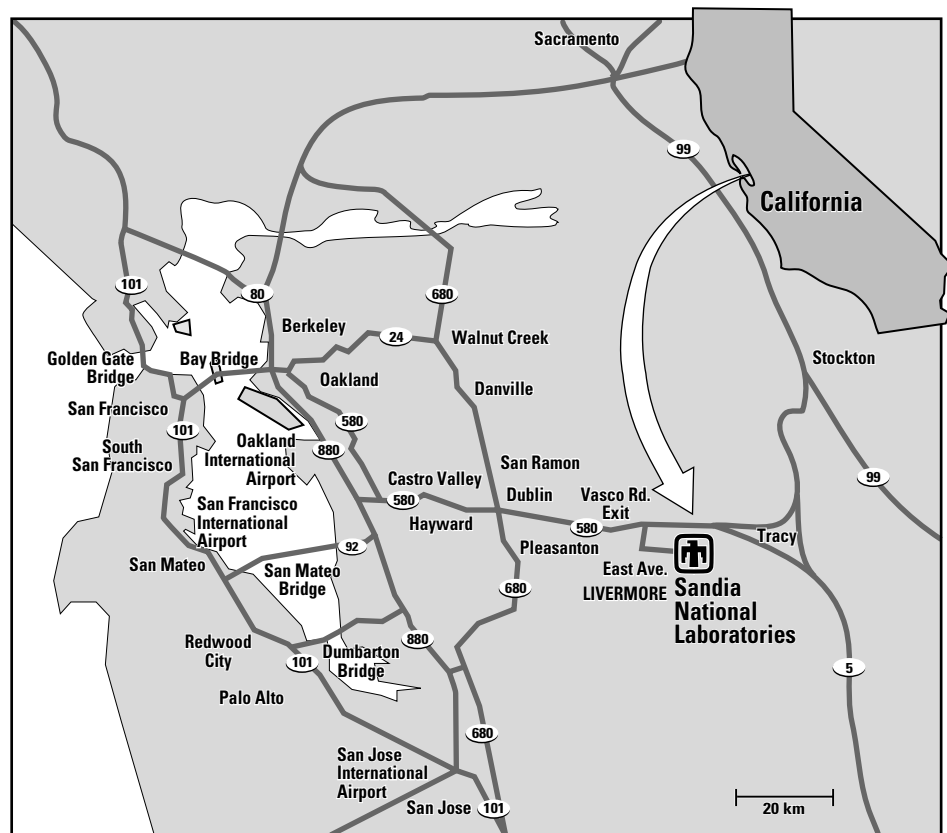


Figure 2-1. SNL, California in a regional setting.

INTRODUCTION

ratories' California facility comprise three broad programmatic areas:

Vital Role in Weapons: This program involves work in support of our nation's nuclear weapons program. These activities include weapon systems, weapon components/subsystems, reliability assessments, engineering sciences, advanced computing/networking, supporting and research.

Integrated Systems and Technologies: This program applies strong systems engineering practices and selected Sandia technologies to provide solutions for evolving national security needs. Work includes detection, nonproliferation, demilitarization of weapons of mass destruction, development of secure, distributed information systems, applied research and development of combustion systems, and micro-fabrication.

Strong Research Base: This program performs world-class science in key competencies such as materials and engineering sciences, chemical sciences, information sciences, and an emerging competency in biological sciences. The work builds on both modeling and experimentation to provide linkages to global science and to ensure a seamless transition to many applications within Vital Role in Weapons and Integrated Systems and Technologies.

Exemplary Operations: This program partners with the three business areas described above to ensure an infrastructure that provides competitive advantage in implementing the site strategy. Most of the site's support and operations services are included in this business area.

SNL, California incorporates the highest regard for environment, safety, and health (ES&H) into every experiment and all site operations. SNL, California operates under the scope of federal, state, and local regulatory authorities and has obtained all appropriate operating permits. Sandia is committed to operate in full compliance with the letter and spirit of applicable environmental laws, regulations, and standards. Furthermore, SNL,

California strives to go beyond compliance with legal requirements by making every effort practical to reduce impacts to the environment to levels as low as reasonably achievable.

ENVIRONMENT, SAFETY, AND HEALTH OVERSIGHT

SNL, California has established a corporate-level ES&H organization. The Sandia Corporation president has overall responsibility for ES&H. Together, they are ultimately responsible for establishing and communicating a corporate culture that considers the protection and preservation of the environment and the safety and health of its personnel, contractors, visitors, and the public, to be critical to Sandia's success.

SNL, California has an ES&H organization to carry out the corporate ES&H vision. Its structure is shown in Fig. 2-2. This organization implements ES&H programs and ensures compliance with regulations specific to the SNL, California.

To help assure that ES&H commitments are fulfilled, SNL, California has established a Sandia, California ES&H Council (SCEC). The SCEC ensures top-level management involvement in developing and monitoring ES&H goals. It establishes, promotes, and communicates a culture that recognizes ES&H as a top priority at SNL, California. The SCEC also provides leadership and consistency of approach in the SNL, California ES&H program. It provides a mechanism for organizational communication—both horizontally and vertically

The SNL, California Safety, Health and Environment Appraisal Committee provides the SNL, California vice president with an assessment of the SNL, California's Site's operational ES&H status. The committee assesses the SNL, California Site to assure that procedures are being properly implemented to provide a safe and healthful workplace, protection of the environment, and protection of

property against loss and damage due to accidents. It plays an essential role in setting ES&H goals, and promoting and communicating the high priority Sandia places on environment, safety, and health.

The ES&H departments provide oversight of management-related ES&H activities and provides direct ES&H assurance information to the SNL, California vice president for the SNL, California Site. The departments ensure uniform implementation of corporate ES&H management processes through the use of organizational ES&H coordinators. Additionally, the departments conduct internal audits and self-assessments of the SNL, California's ES&H management processes.

SELF-ASSESSMENT PROGRAM

SNL, California ES&H Self-Assessment process was implemented as part of feedback and improvement of Division 8000's Integrated Safety Management System (ISMS) in April 1998. The ES&H Self-Assessment process falls under the umbrella of Chapter 22 of the ES&H Manual. Sandia California's *ES&H Self-Assessment Operating Procedure* (OP471726) documents its process elements: responsibilities, planning, scheduling, information gathering, tracking, verifying, analyzing, evaluating, and reporting. Annual assessments begin in January of each calendar year. Management Surveillances and Management Inspections are both encompassed in SNL California's ES&H Self-Assessment process.

The site's self-assessment activities assess both line implementation and ES&H functional programs. ES&H Safety Committees and managers primarily perform Line Implementation Self-Assessments. The SNL, California ES&H Subject Matter Experts (SMEs) perform Functional Program Self-Assessments. The use of Quality Assurance, Sandia/New Mexico

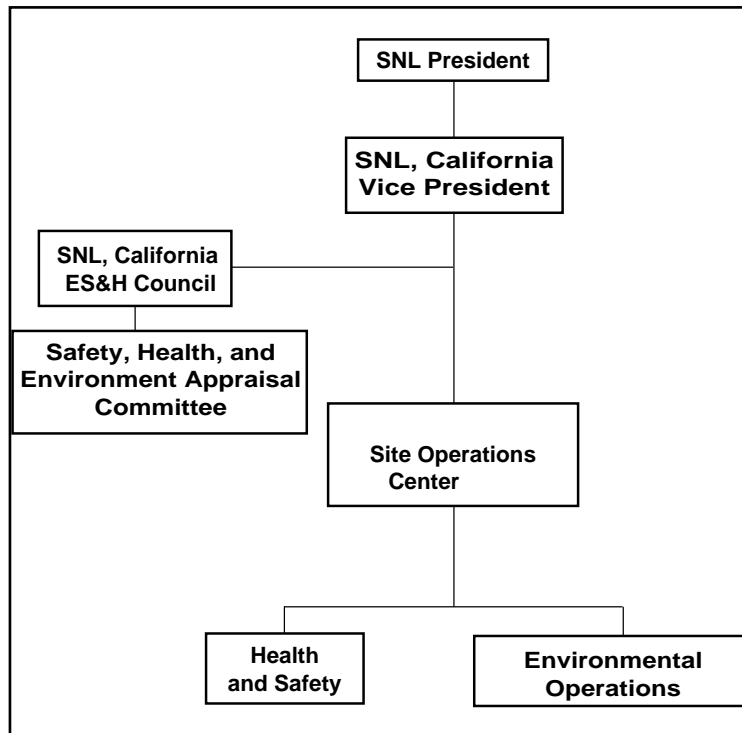


Figure 2-2. Organizational structure of environment, safety, and health at SNL, California.

SMEs, independent contractors, or other DOE laboratory personnel is allowed.

SNL, California's ES&H Self-Assessments are conducted both annually and over a 3-year period. Management Self-Assessments are conducted such that all space, under the control of that Manager, is assessed annually for ES&H concerns by a team consisting of the responsible Manager, and an ES&H Coordinator. Safety Committee Self-Assessments are primarily made up of line staff and an SME. They are conducted at a minimum quarterly, such that a sampling of operations onsite is reviewed at least every 3 years, unless required otherwise. Functional Program Self-Assessments are conducted such that a sampling of each program element is assessed at least every 3 years, unless required otherwise. Each Functional Program Self-Assessment is conducted within a 7-workday time frame to ensure that other program responsibilities can be met.

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Findings generated by SNL, California's ES&H Self-Assessments are documented in AuditProfiles audit database. Corrective actions are tracked in EP Tracker and transferred to the site's web-based tracking database. Managers are responsible for tracking and closing out corrective actions on the web. Communication of corrective actions at the worker level is the manager's responsibility.

The self-assessment results are reported to SNL, California's Safety Health and Environment Appraisal Committee (SHEAC) annually, for review of strengths, weaknesses, and trends. Overdue corrective actions for findings are reported at all SHEAC meetings. The results of SNL, California's ES&H Self-Assessments are also included quarterly and annually in the Corporate ES&H Report. Broad general results of the assessments in CY2001 include:

- 103 assessments were performed.
- 100% of the SNL/California space was assessed, documented, and findings tracked.
- 719 of the 782 findings identified as of 12/31/01, were closed, 63 were open, and of those, 11 corrective actions were overdue for completion.

The objectives of SNL, California's ES&H Self-Assessments are to measure improvement in the implementation of the Integrated Safety Management System (ISMS) and to help ensure that SNL, California meets the Corporate Performance Objectives:

- Protect the people,
- Protect the environment,
- Comply with regulations, and
- Use good management practices.

INTERDISCIPLINARY TEAM

The ES&H Interdisciplinary Team (IDT) is comprised of representatives from each of the primary disciplines within ES&H. The IDT is responsible for helping SNL, California's project teams consider ES&H issues as they plan and implement new

projects or change ongoing projects. By reviewing proposed projects early in the planning stages, the Interdisciplinary Team helps to ensure projects and experiments are conducted safely and on schedule.

SNL, CALIFORNIA ENVIRONMENT, SAFETY, AND HEALTH ORGANIZATION

The organization responsible for ES&H at SNL, California is the Site Operations Center. An important part of the center's mission is to ensure the health and safety of SNL, California employees and the general public, and to protect the environment. This mission is fulfilled by helping SNL, California employees understand and comply with DOE orders and their legal responsibilities under federal, state, and local laws and regulations. The Site Operations Center has two departments involved in ensuring workplace safety and protection of the environment: Health Protection, and Environmental Operations. See Figure 2-2.

The Environmental Operations Department is responsible for ensuring that operations at SNL, California are conducted in an environmentally responsible manner and in compliance with applicable laws and regulations. Department personnel contribute their expertise and services to guide and support other SNL, California departments in achieving their missions and goals. They are directly responsible for this report and the activities described herein. Therefore, their specific responsibilities are described below.

ENVIRONMENTAL OPERATIONS DEPARTMENT

The Environmental Operations Department maintains a variety of programs to monitor the environmental impacts of site emissions, to preserve the quality of the environment, and to properly manage (minimize and dispose of) hazardous

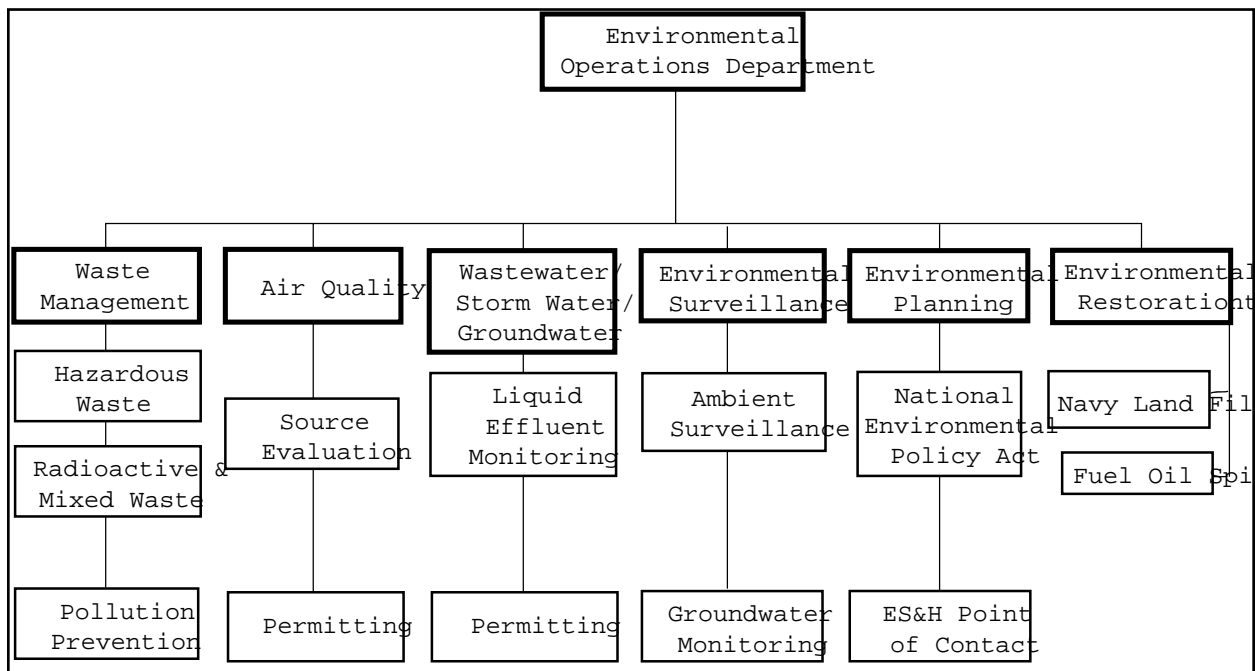


Figure 2-3. Organizational structure of the Environmental Operations Department.

waste. To fulfill its mission, the department has groups responsible for waste management, pollution prevention, environmental surveillance, air quality, environmental planning, and wastewater/storm water management (Fig. 2-3). The following sections briefly describe the activities of these groups.

Waste Management

The Waste Management Program is responsible for managing radioactive, mixed, medical, energetic, and hazardous wastes. Waste management activities include the collection, onsite transport, storage, treatment, packaging, and shipment of wastes in accordance with DOE, Environmental Protection Agency (EPA), and state-specified regulations and requirements. The group also manages the following Waste Management Program activities: training, permitting, reporting, interfacing with regulators through the DOE, program planning, record keeping, and budgeting.

The Waste Management Group is responsible for operations conducted in the Hazardous Waste Storage Facility,

and the Radioactive and Mixed Waste Storage Facility. In addition, the group manages the permitting of two on-site neutralization facilities that are regulated under “tiered permitting.”

Pollution Prevention

The Pollution Prevention Program is responsible for promoting pollution prevention and source reduction of all wastes in all site activities. Responsibilities include:

- gathering process information,
- assisting in and evaluating pollution prevention,
- fostering employee awareness of pollution prevention and source reduction issues and technologies, and
- developing and maintaining site recycling programs.

The Pollution Prevention Program also is responsible for preparing reports to the DOE and to federal, state, and local regulators. SNL, California has a waste-minimization/pollution-prevention coordinator to manage these efforts.

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Environmental Restoration

The Environmental Restoration Program is responsible for assessing the extent of historical contamination of SNL, California sites and managing any necessary restoration efforts.

Environmental Surveillance/Compliance Groundwater Monitoring

The Environmental Surveillance Program at SNL, California assesses potential impacts to the public and the environment from site operations. The group is responsible for ensuring that SNL, California complies with federal, state, and local regulations and with DOE orders governing protection of the environment. Specifically, environmental surveillance personnel maintain a direct radiation monitoring system. The Program also ensures SNL, California's compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAPs) Rule for Radionuclides, under the Federal Clean Air Act (CAA), and DOE orders.

The group also performs computer modeling of potential emissions to document compliance with these regulations. The group uses these systems to monitor the general environment of SNL, California and nearby vicinity to verify that emission controls are effective in preserving the local environs.

This group is also responsible for the monitoring of groundwater in compliance with state regulations.

The group also prepares numerous reports and other documents to demonstrate compliance.

Air Quality

The Air Quality Program manages a program to facilitate site compliance with regulations governing air emissions to the environment. The Air Quality Compliance Program maintains the site air emissions inventory and evaluates Sandia operations that are potential sources of air pollutants.

Chemical Information Management (Health & Safety Department)

The Chemical Information Management Program is responsible for providing consultation for chemical analysis and data review and for maintaining the site-wide Chemical Information System/Material Safety Data Sheet (MSDS) system. This system is a relational database containing comprehensive information for tracking chemicals used at SNL, California. It includes a site-wide chemical inventory of more than 40,000 bar-coded chemical containers and potential, personnel chemical-exposure data. The system also manages more than 60,000 MSDS, which are available to all site personnel on the SNL Internal Web. The system includes hazardous, radioactive, and mixed waste tracking information.

Environmental Planning

Elements of the Environmental Planning Program include compliance with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and laws and regulations related to biological and cultural resources. The Environmental Planning Program provides guidance to all SNL, California organizations in meeting NEPA and CEQA requirements. The Program monitors sensitive species found onsite and provides guidance for species conservation. Other responsibilities of the Environmental Planning Program include evaluating potential ES&H effects of new and continuing projects at SNL, California; interfacing with DOE on all program elements; and overseeing cultural/historic resource evaluations.

Wastewater/Storm Water/Management

The Wastewater/Storm Water Management Program is responsible for ensuring that SNL, California complies with all federal, state, and local regulations and DOE orders regarding the quality of wastewater and storm water discharges. The group performs the following operations:

- Monitors these discharges both visually and through sampling and analysis.
- Verifies that wastewater and storm water discharges are in compliance with established standards and requirements.
- Prepares numerous reports, permit applications, and other documents to demonstrate compliance with various environmental regulations and DOE orders.
- Implements controls to ensure that SNL, California site activities do not impact the quality of surface waters in the vicinity or in the San Francisco Bay (to which site storm water drains).

SITE DESCRIPTION

This section provides an overview of the SNL, California site, the physical environment and the ecological characteristics of the area.

Laboratory Facility

The SNL, California site covers 1.7 km² (410 acres), which includes 213 acres of developed areas. In 1986 and 1987, the DOE acquired 228 acres to provide a security buffer zone between developed areas and the Laboratory.

The site facilities comprise approximately 74,400 m² (801,000 ft²) of building floor space. Of this, about 31% is office and drafting areas, 48% is light laboratories and shops, and 3% is heavy laboratories (e.g., high-pressure test facilities and explosives chambers). The remaining 18% is classified as miscellaneous usage,

such as computer rooms and library space.

Because SNL, California is a multi-programmatic laboratory involved in a broad range of research and development, facilities are designed for small-scale scientific and applied engineering research. The site has neither production nor large-scale manufacturing operations.

Airborne Emissions

SNL, California has sources of uranium, principally depleted uranium. All operations with the potential to emit uranium are controlled by both administrative and physical controls. Any operation with the potential to emit radionuclides to the environment undergoes an evaluation in accordance with NESHAPs. Nonradiological emissions include nitrogen oxides (NO_x), particulates, and precursor organic compounds.

Water Supply and Sewer Effluent

The site's water supply normally comes from the Hetch Hetchy Aqueduct, which is supplemented occasionally by water from the Zone 7 Flood Control and Water Conservation District. Sandia's sanitary sewer effluent merges with the Lawrence Livermore National Laboratory (LLNL) sewer system, and the combined waste stream discharges to the City of Livermore sanitary sewer system at the northwest corner of the LLNL site. The sanitary sewer effluent from the SNL, California site (and from the rest of the Livermore area) is processed at the Livermore Water Reclamation Plant. After treatment, the wastewater is transported via pipeline to the San Francisco Bay. A portion of the treated effluent is reclaimed and used for local irrigation.

Topography

The Livermore Valley (Fig. 2-4) is an irregularly shaped lowland in the Diablo Range of the California Coastal Mountain Range. The valley is approximately 26 km

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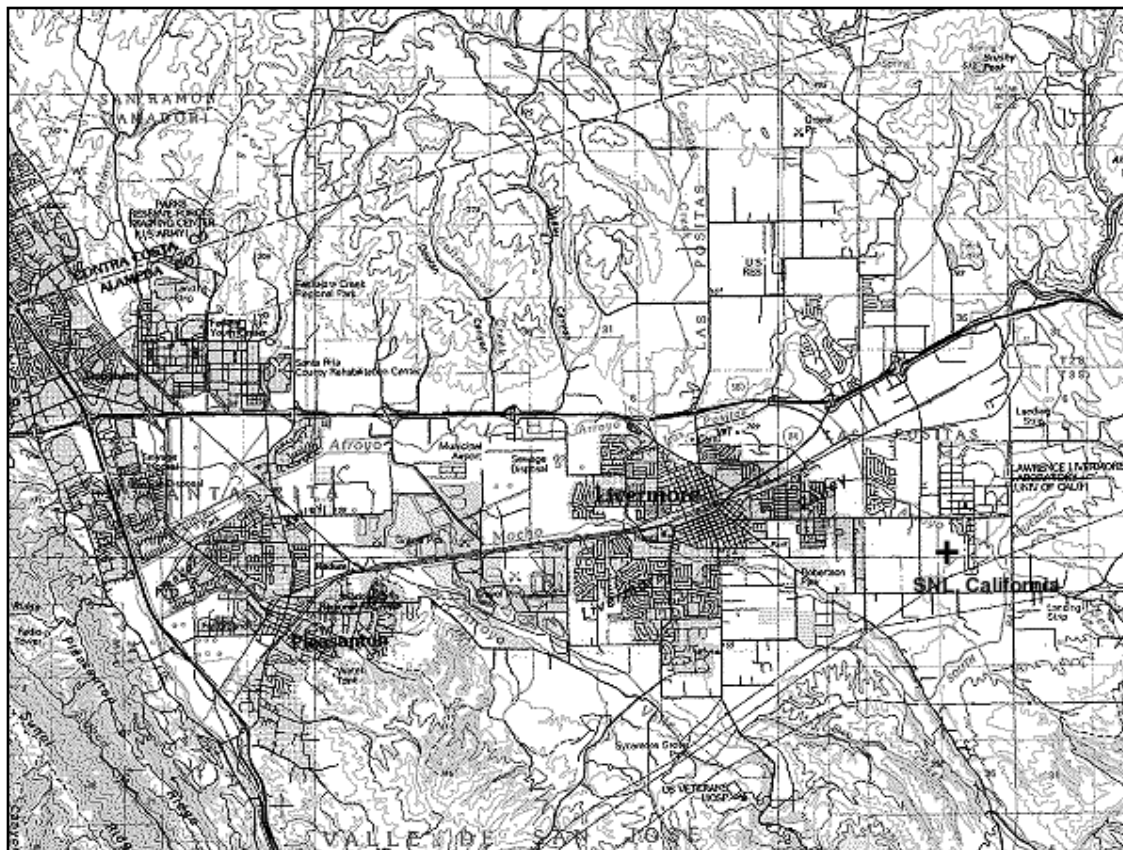


Figure 2-4. Topography of Livermore Valley. SNL, California is located at the in the panhandle just south of Lawrence Livermore National Laboratory.

(16 miles) long (east to west) and averages about 11 km (7 miles) wide. The valley floor slopes gently downward to the west at about 10 m/km (50 ft/mile). The elevation is approximately 200 m (660 ft) at the eastern boundary of the valley and 90 m (295 ft) at the southwest corner.

The topography of the California site is generally characterized by relatively flat areas at the northern portion of the site, hills to the south, and steep banks along the Arroyo Seco.

Geology and Hydrology

The Livermore Valley overlies a complex geologic region where ancient arroyos have deposited a heterogeneous mixture of sand, silt, clay, and gravel. These alluvial deposits create layers of higher and

lower permeability overlying the older Livermore formation.

The groundwater of the Livermore Valley can be found in the more permeable layers, which lie between 5 and 33 m (17 and 110 ft) below the surface (Fig. 2-5). Groundwater in the Livermore Valley generally flows in a westerly direction. The groundwater movement underlying the SNL, California site is strongly influenced by the Las Positas Fault Zone. North of the fault, movement is generally westerly. South of the fault, the movement is less distinct, but appears to be radial from a groundwater mound.

Located in west-central California, the site is in a seismic region. The major faults are San Andreas, Hayward, Calaveras, and Greenville. The closest major faults are Calaveras—about 11 miles west of the site,

and Greenville—about 2 miles east of the site. A small, locally active fault, the Las Positas Fault, runs through the southern portion of the site.

Intermittent streams (arroyos) flowing northwest carry surface drainage into the Alameda Creek near Sunol, which continues west to the San Francisco Bay. The Arroyo Seco crosses the site from the southeast to the northwest. Storm water runoff from the hills to the southeast flows into the arroyo during the rainy season. The arroyo is dry the rest of the year. The SNL, California site storm sewer system also channels storm water into the Arroyo Seco. This system is the main pathway for the site's surface drainage.

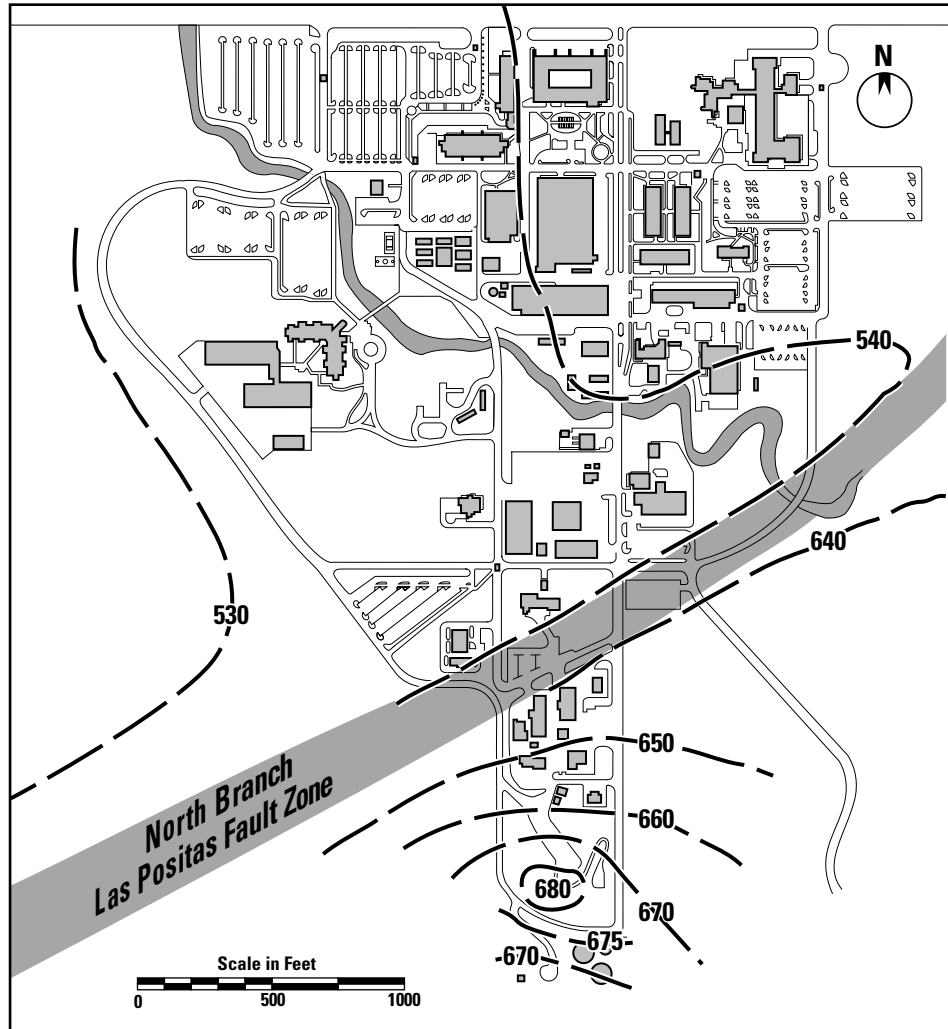


Figure 2-5. Typical groundwater contours at SNL, California.

Climate and Meteorology

The climate of the Livermore Valley consists of mild, rainy winters and warm, dry summers. The mean annual temperature is 12.5°C (55°F), with extremes ranging from 0° to 38°C (32° to 100°F). Rain falls primarily between October and April. Precipitation at the SNL, California site for calendar year 2000 was 33.30 cm (13.11 in.). The prevailing winds blow from the west and southwest from April to September. The winds are variable during the rest of the year.

Biological Resources

The ecology at SNL/CA is typical of the surrounding region, consisting primarily of grassland. Localized areas of coyote brush scrub, riparian woodland, and aquatic habitat are also present. Areas developed and disturbed by Sandia operations constitute an additional habitat type, designated altered habitat. Grassland makes up approximately 266 acres and is dominated by nonnative grasses and herbs. Scattered patches of native wildflowers, mature valley oaks, and valley oak saplings are also present. Coyote brush scrub occurs in two small areas totaling 1.5 acres. Riparian woodland is

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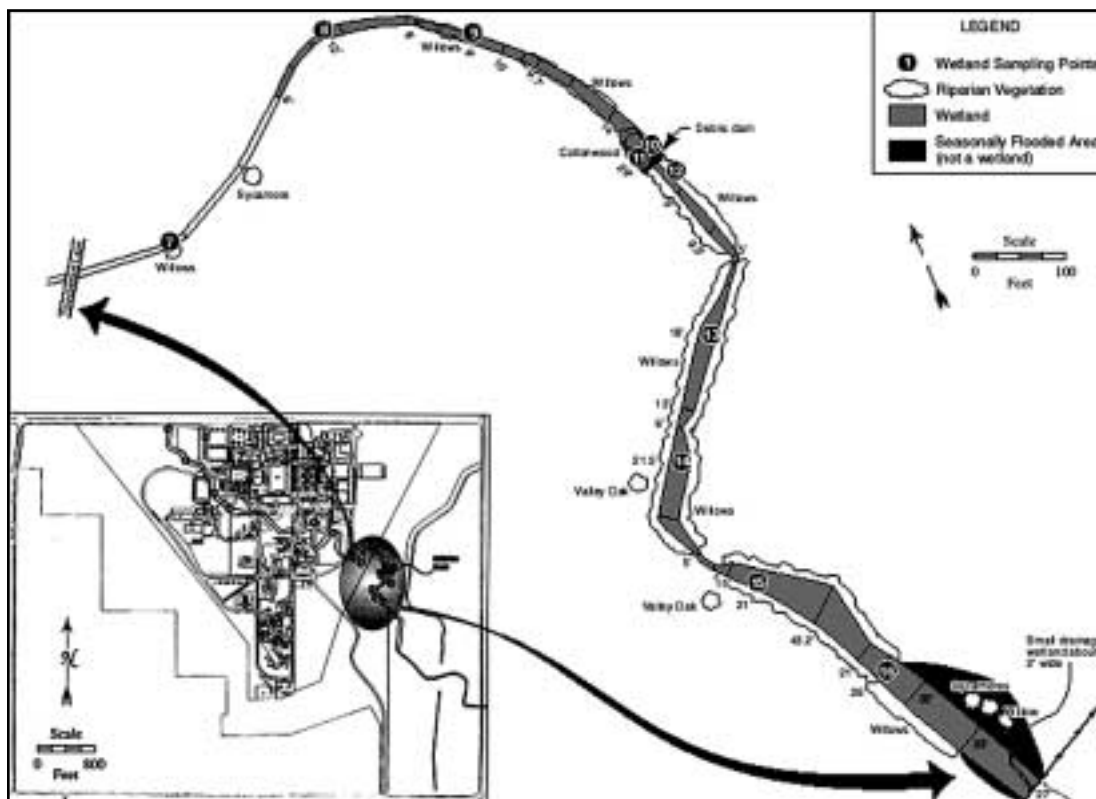


Figure 2-6. SNL, California wetland areas.

present along the Arroyo Seco on the eastern side of the site and makes up approximately 2.4 acres. Willows are the dominant plant species found in the riparian area. Aquatic habitat makes up approximately 3.14 acres and is found in the wetland area located in the eastern section of Arroyo Seco and at the recharge basins in the west buffer. Vegetation in the aquatic habitat is dominated by mugwort, rushes, and cattails. Altered habitat is approximately 134 acres in size.

Wildlife species present at SNL/CA include birds, amphibians, reptiles, and mammals (Tables 2-1 through 2-4). More than fifty bird species have been observed onsite. Most of these are protected under the *Migratory Bird Treaty Act of 1918*. Several birds are also special concern species. The golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalia*), Cooper's hawk (*Accipiter cooperii*), and northern harrier (*Circus cyaneus*) are California species of special

concern. The white-tailed kite (*Elanus caeruleus*) is a California fully protected species. The loggerhead shrike (*Lanius ludovicianus*) and burrowing owl (*Athene cunicularia*) are federal and California species of special concern. Of these special concern species, the loggerhead shrike is the only one known to be nesting onsite. California tiger salamanders (*Ambystoma californiense*), a federal candidate species for listing under the Endangered Species Act and a California species of special concern, have been observed at various locations onsite. No threatened or endangered species have been found at SNL/California.

Another sensitive biological resource at SNL/California is the Arroyo Seco. In March 2001, it was designated as critical habitat for the California red-legged frog (*Rana aurora draytonii*). To date, no red-legged frogs have been found onsite.

Table 2-1 Bird Species Observed at SNL/CA Since 1994

Common Name	Scientific Name	Protected Status ^a
American coot	<i>Fulica Americana</i>	MBTA
American crow	<i>Corvus brachyrhynchos</i>	MBTA
American kestrel	<i>Falco sparverius</i>	MBTA
American robin	<i>Trudus migratorius</i>	MBTA
Anna's hummingbird	<i>Calypte anna</i>	MBTA
Barn owl	<i>Tyto alba</i>	MBTA
Barn swallow	<i>Hirundo rustica</i>	MBTA
Bewick's wren	<i>Thryomanes bewickii</i>	MBTA
Black phoebe	<i>Sayornis nigricans</i>	MBTA
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	MBTA
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	MBTA
Brown headed cowbird	<i>Molothrus ater</i>	MBTA
Bufflehead	<i>Bucephala albeola</i>	MBTA
Burrowing owl	<i>Athene cunicularia</i>	MBTA, CSC
Bushtit	<i>Psaltirparus minimus</i>	MBTA
California quail	<i>Callipepla californica</i>	Unknown
California towhee	<i>Pipilo crissalis</i>	MBTA
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	MBTA
Common yellowthroat	<i>Geothlypis trichas</i>	MBTA
Cooper's hawk	<i>Accipiter cooperii</i>	MBTA, CSC
Dark-eyed junco	<i>Junco hyemalis</i>	MBTA
European starling	<i>Sturnus vulgaris</i>	None
Ferruginous hawk	<i>Buteo regalia</i>	MBTA, CSC
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	MBTA
Golden eagle	<i>Aquila chrysaetos</i>	MBTA, CSC
Great blue heron	<i>Ardea herodias</i>	MBTA
Great egret	<i>Ardea alba</i>	MBTA
Great horned owl	<i>Bubo virginianus</i>	MBTA
Hermit thrush	<i>Cathrus guttatus</i>	MBTA
House finch	<i>Carpodacus mexicanus</i>	MBTA
House wren	<i>Troglodytes aedon</i>	MBTA
Killdeer	<i>Charadrius vociferous</i>	MBTA
Lesser goldfinch	<i>Carduelis psaltria</i>	MBTA
Loggerhead shrike	<i>Lanius ludovicianus</i>	MBTA, CSC
Mallard	<i>Anas platyrhynchos</i>	MBTA
Mourning dove	<i>Zenaida macroura</i>	MBTA
Northern flicker	<i>Colaptes auratus</i>	MBTA
Norther harrier	<i>Circus cyaneus</i>	MBTA, CSC
Northern mockingbird	<i>Mimus polyglottos</i>	MBTA
Nuttall's woodpecker	<i>Picoides</i>	MBTA
Red-breasted sapsucker	<i>Sphyrapicus rubber</i>	MBTA
Red-tailed hawk	<i>Buteo jamaicensis</i>	MBTA
Red-winged blackbird	<i>Agelaius phoeiceus</i>	MBTA
Rock dove	<i>Oumba livia</i>	None
Ruby-crowned kinglet	<i>Regulus calendula</i>	MBTA
Savannah sparrow	<i>Passerculus sandwichensis</i>	MBTA

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Table 2-1 Bird Species Observed at SNL/CA Since 1994 (continued)

Common Name	Scientific Name	Protected Status ^a
Song sparrow	<i>Melospiza melodia</i>	MBTA
Spotted towhee	<i>Pipilo maculatus</i>	MBTA
Turkey vulture	<i>Cathartes aura</i>	MBTA
Western kingbird	<i>Tyrannus verticalis</i>	MBTA
Western meadowlark	<i>Sturnella neglecta</i>	MBTA
Western scrub jay	<i>Aphelocoma californica</i>	MBTA
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	MBTA
White-tailed kite	<i>Elanus caeruleus</i>	MBTA, state fully protected
White-throated swift	<i>Aeronautes saxatalis</i>	MBTA
Wrentit	<i>Chamaea fasciata</i>	None
Violet-green swallow	<i>Tachycineta thalassina</i>	MBTA
Yellow rumped warbler	<i>Dendroica coronata</i>	MBTA

^aMBTA Migratory Bird Treaty Act (FWS 2001)
 FSC, CSC Federal or California species of special concern

Table 2-2 Amphibian and Reptile Species Observed at SNL/CA Since 1994

Common Name	Scientific Name	Protected Status ^a
California tiger salamander	<i>Ambystoma californiense</i>	FC, CSC
Gopher snake	<i>Pituophis melanoleucus</i>	None
Pacific chorus frog	<i>Pseudacris regilla</i>	None
Western fence lizard	<i>Sceloporus occidentalis</i>	None
Western toad	<i>Bufo boreas</i>	None

^aFC Federal candidate species
 CSC California species of special concern

Table 2-3 Mammal Species Observed at SNL/CA Since 1994^a

Common Name	Scientific Name
Audubon rabbit	<i>Sylvilagus audubonii</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
California ground squirrel	<i>Spermophilus beecheyi</i>
Coyote	<i>Canis latrans</i>
Feral cat (domestic)	<i>Felis catus</i>
Fox squirrel	<i>Sciurus niger</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Mountain lion	<i>Felis concolor californica</i>
Mule deer	<i>Odocoileus hemionus</i>
Opossum	<i>Didelphis virginiana</i>
Pocket gopher	<i>Thomomys bottae</i>
Raccoon	<i>Procyon lotor</i>
Red fox	<i>Vulpes vulpes</i>
Striped skunk	<i>Mephitis mephitis</i>

^aNone of the mammals at SNL/CA are threatened, endangered, or sensitive species

ANNUAL SITE ENVIRONMENTAL REPORT

This Annual Site Environmental Report documents all SNL, California's significant environmental activities throughout the year. These include effluent and environmental monitoring, environmental restoration, and environmental protection activities. This report also evaluates SNL, California's compliance with applicable environmental requirements. It is prepared according to the requirements of DOE Guidance.

An extensive glossary at the end of this report defines commonly used acronyms and abbreviations, as well as other technical terms used in the body of the report. The International System of Units (SI) or metric system of measurements has been used, where feasible. A section on "Units of Measure" is included in the glossary as additional information about the system of units and quantities.

Appendix A contains laboratory procedures.

REFERENCE

1. U.S. DOE, Order 5400.1, General Environmental Protection Program (November, 1988, Change 1, June 29, 1990).

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